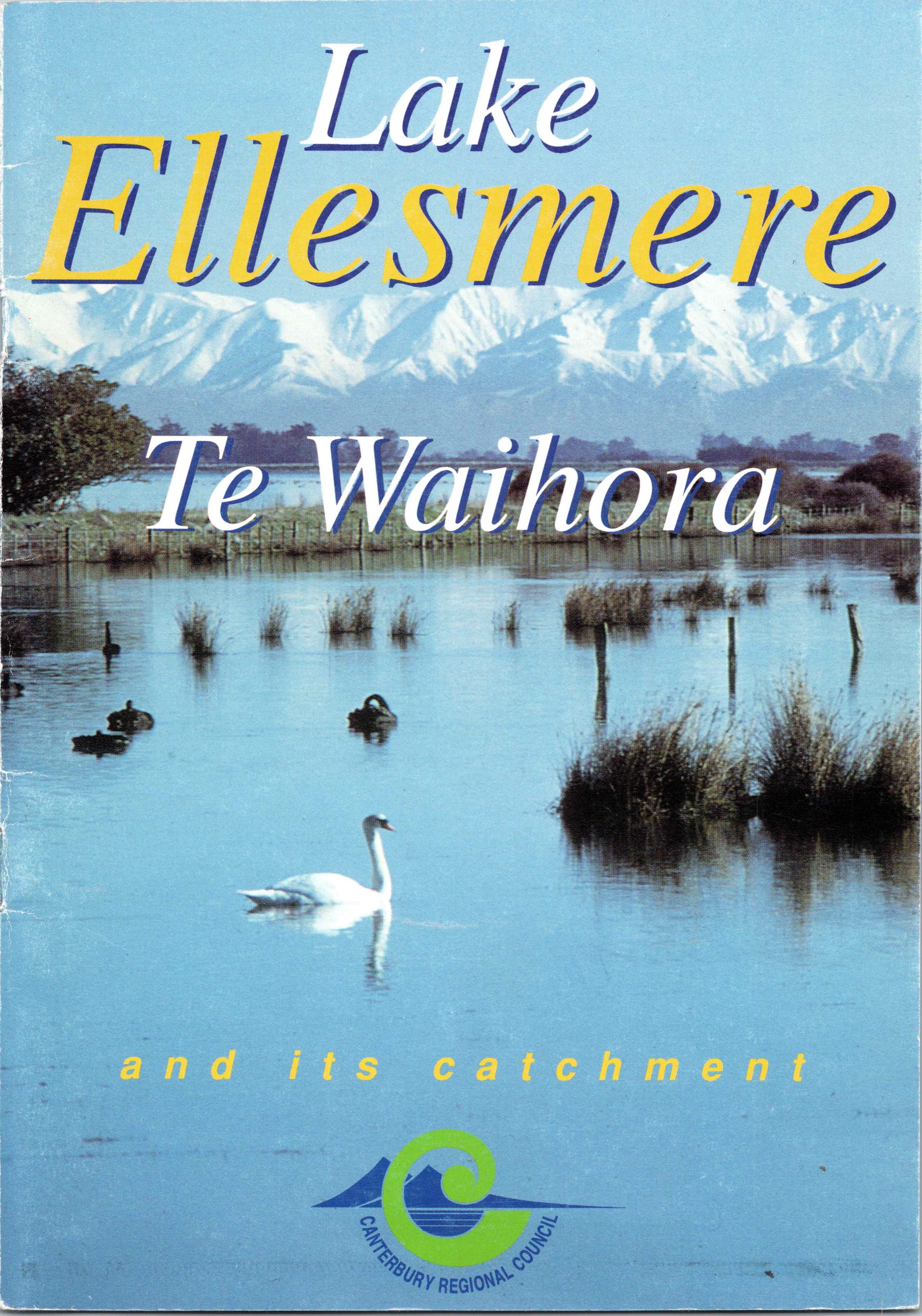
Lake Ellesmere

Te Waihora



and its catchment

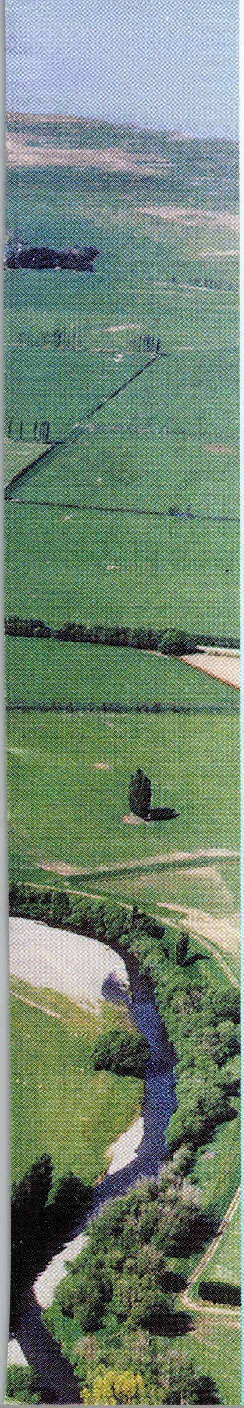
CANTERBURY REGIONAL COUNCIL

Foreword

This booklet gives a brief overview of a major technical report "The Natural Resources of Lake Ellesmere Te Waihora and its Catchment". It is written for people with an interest in the area and is intended for widespread general use. The Canterbury Regional Council hopes it will increase your understanding and enjoyment of the lake, its many rivers and tributaries and its wider environment.

Front cover photograph: Michael Bennetts (Hedgehog House)
This page: Aerial view of Lower Selwyn and Lake Ellesmere. (Michael Provost)

Introduction



The lake and its catchment

Once, it was an estuary of the mighty Waimakariri River. Once, the lake covered an area twice as large as it does today, and a canoe could be paddled from Taumutu almost unhindered to the Avon-Heathcote Estuary.

Today, Lake Ellesmere-Te Waihora covers 20,000 hectares, NZ's fourth largest lake. It is internationally significant for its wildlife abundance and diversity.

The National Water Conservation Order (1990) declared it an outstanding wildlife habitat. Up to 98,000 wetland birds can use the lake at any one time. There are recorded sightings of 161 species. It is the breeding place for 37 species and a resting place for 39 species of migratory wading birds.

The lake is unusual. It is salty and shallow, with an average depth of 1.4 metres. It is really a brackish, bar-type lagoon, with a long shore line and varying lake levels.

Salt-marsh vegetation is of national importance, with more than 50 different types around the lake.

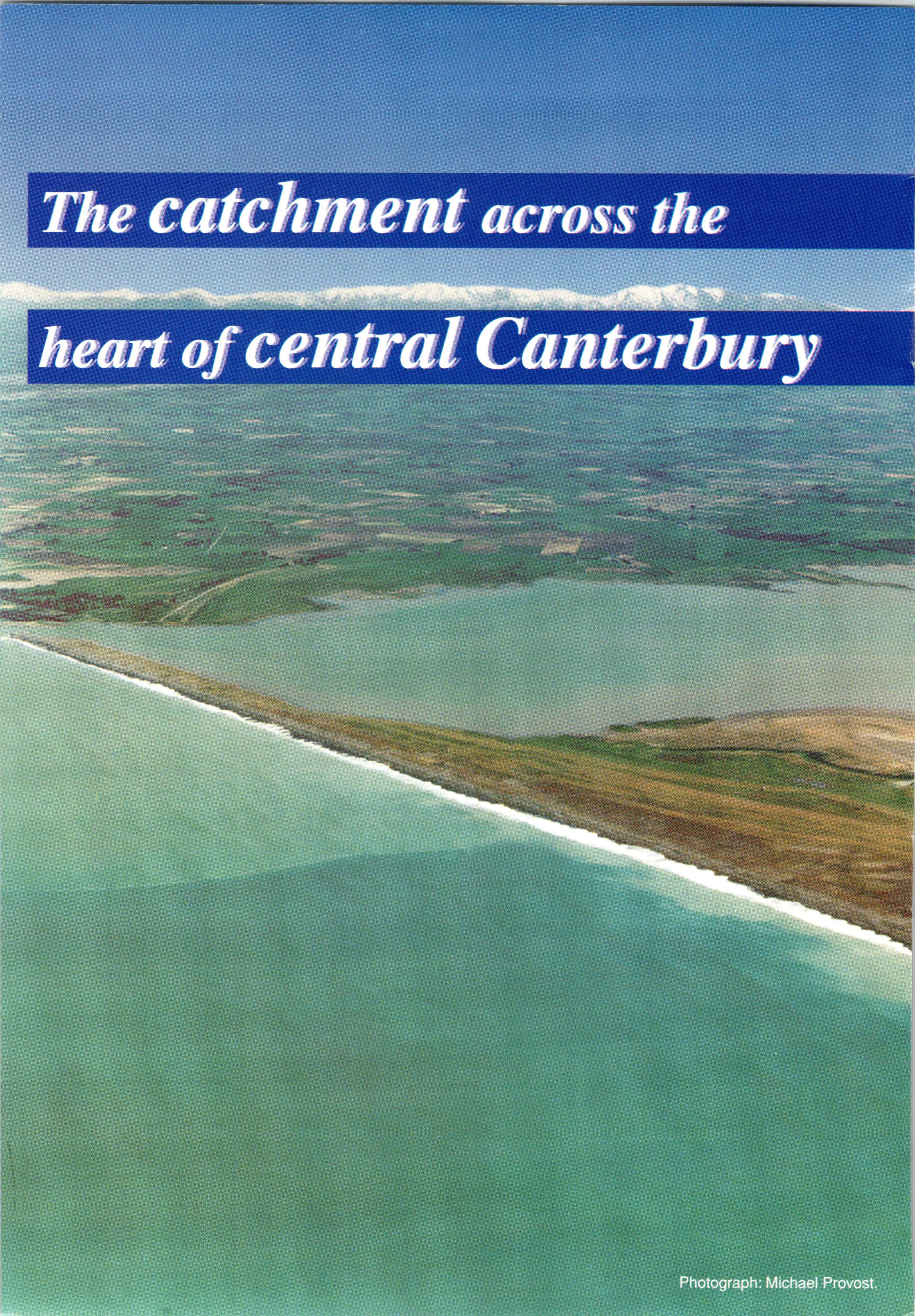
Ngāi Tahu have lived alongside the lake for more than 40 generations, guarding its magnificent food and cultural resources.

The catchment drains 256,000 hectares. Rivers flow from the foothills of the Southern Alps, coastal plains and the hills of Banks Peninsula. River and lake water comes from rain, fresh springs and groundwater - a complex system not yet fully understood.

The catchment vegetation has been extensively modified with 80% now under pasture. There are 21 protected natural areas or reserves. The largest belong to the Conservation Estate, e.g. Thirteen Mile Bush, Mt Herbert Scenic Reserve.

Changing land use has directed attention to the environmental impacts of human activities. What were once extensive flax and raupo wetlands around the lake are now fertile farms. Extensive drainage and flood protection works have further changed the face of the land.

There is not yet enough information to determine if plant nutrient concentrations in the lake are increasing but there are serious concerns about water quality throughout the catchment.



The catchment across the heart of central Canterbury

Photograph: Michael Provost.

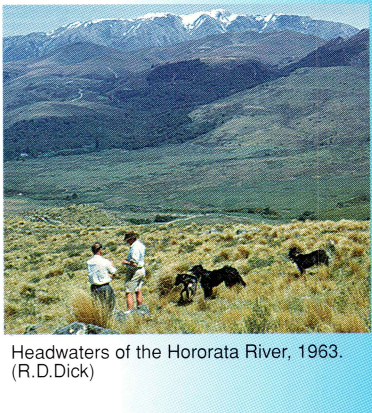
The Lake Ellesmere-Te Waihora catchment stretches across the heart of central Canterbury from the Big Ben Range on the eastern side of the Southern Alps to the coast. It is bounded to the south by the Rakaia River, and to the north by the Waimakariri River as far downstream as Halkett, and skirts around Christchurch to the hills of Banks Peninsula.

The catchment consists of four distinct areas:

- **the foothills of the Southern Alps**
- **the Central Canterbury Plains**
- **the western hills of Banks Peninsula**
- **the lake and its margins**

The foothills comprise the upper catchments of the Selwyn River and its tributaries, the Hororata, Hawkins and Waianiwaniwa rivers. The highest point is 1669 metres in the Big Ben Range. The foothills are formed of sandstone and mudstone rocks laid down under the sea up to 300 million years ago, and uplifted during mountain building phases. They were eroded by mighty glaciers during successive ice ages.

About three-quarters of the Lake Ellesmere catchment is made up from the Central Canterbury Plains. They were slowly built by the gravel, sand and silt supplied by extensive glaciers in the valleys of the Waimakariri and Rakaia rivers during the most recent ice ages, beginning about 2.5 million years ago. The two rivers built up huge overlapping outwash fans. The upper Selwyn River, which was not glaciated, flows south-east in a depression between the two fans into Lake Ellesmere.



Headwaters of the Hororata River, 1963. (R.D.Dick)

Banks Peninsula was originally an island formed by large volcanic eruptions beginning 12 million years ago. Water erosion has gradually reduced the now extinct volcanoes to their present form. A number of small streams drain from valleys on the western side into the Halswell River or, like Prices Steam and Kaituna River, flow directly into the lake. The highest point on Banks Peninsula within the catchment is Mount Herbert, at 920 metres above sea level. Much of the basalt rock from the volcanoes is covered in fine, windblown silt (loess) from the plains river beds.

Lake Ellesmere-Te Waihora was formed between 14,000 and 6,000 years ago after the last ice age, when the glaciers retreated, the sea level rose, and the shore line advanced inland. It is enclosed on the seaward side by a 26-kilometre-long barrier, Kaitorete Spit. The spit was formed by sand and gravel driven alongshore by southerly wave action.

The village at Taumutu in 1874. Sketch by Eliot Whately. (Courtesy National Library of Australia)

TE WAIHORA WAS ALSO TE KETE IKA (The Fish Basket)

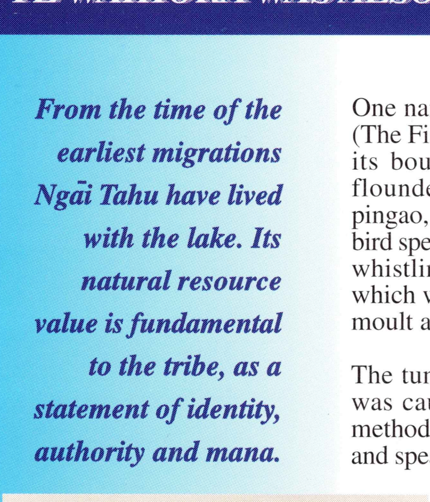
From the time of the earliest migrations Ngāi Tahu have lived with the lake. Its natural resource value is fundamental to the tribe, as a statement of identity, authority and mana.

One name for the lake, Te Kete Ika a Rākaihautū (The Fish Basket of Rākaihautū), directly refers to its bountiful resources and mahinga kai, e.g. flounder, eels, yellow-eyed mullet, whitebait, pingao, flax and paru (mud for dyeing). Numerous bird species were taken, including brown teal ducks, whistling duck, swamp hen and paradise ducks, which were hunted ashore from canoes during the moult and caught in nets.

The tuna, or eel, was particularly important and was caught throughout the year by a variety of methods, e.g. eel traps, tickling, nets, baited lines, and spearing. Ngāi Tahu also opened the lake when it threatened to flood shore line occupation sites such as Taumutu.

Ngāi Tahu have long held concerns about the quantity and quality of water in the lake and its tributaries, and its effects on plant communities which provide habitat for fish and bird populations.

The lake bed has been vested in the Tribe as part of the 1996 settlement of its claim



A catch of long-finned eels, 1912. (Canterbury Museum)

Since 1850

In 1848, when Henry Kemp purchased Canterbury from Ngāi Tahu, the lake catchment was essentially a large area of open, unoccupied grassland and swamp. The arrival of the first four ships in 1850 saw the founding of Canterbury. The settlers quickly took up land across the plains, and drained the swamplands around the lake to farm the fertile soils. They built stock water races across and down the plains to provide a regular water supply. Draining the swamps brought a new problem in dry weather - drought. So the settlers sank hundreds of wells into the groundwater aquifers to provide for their household and farming needs.

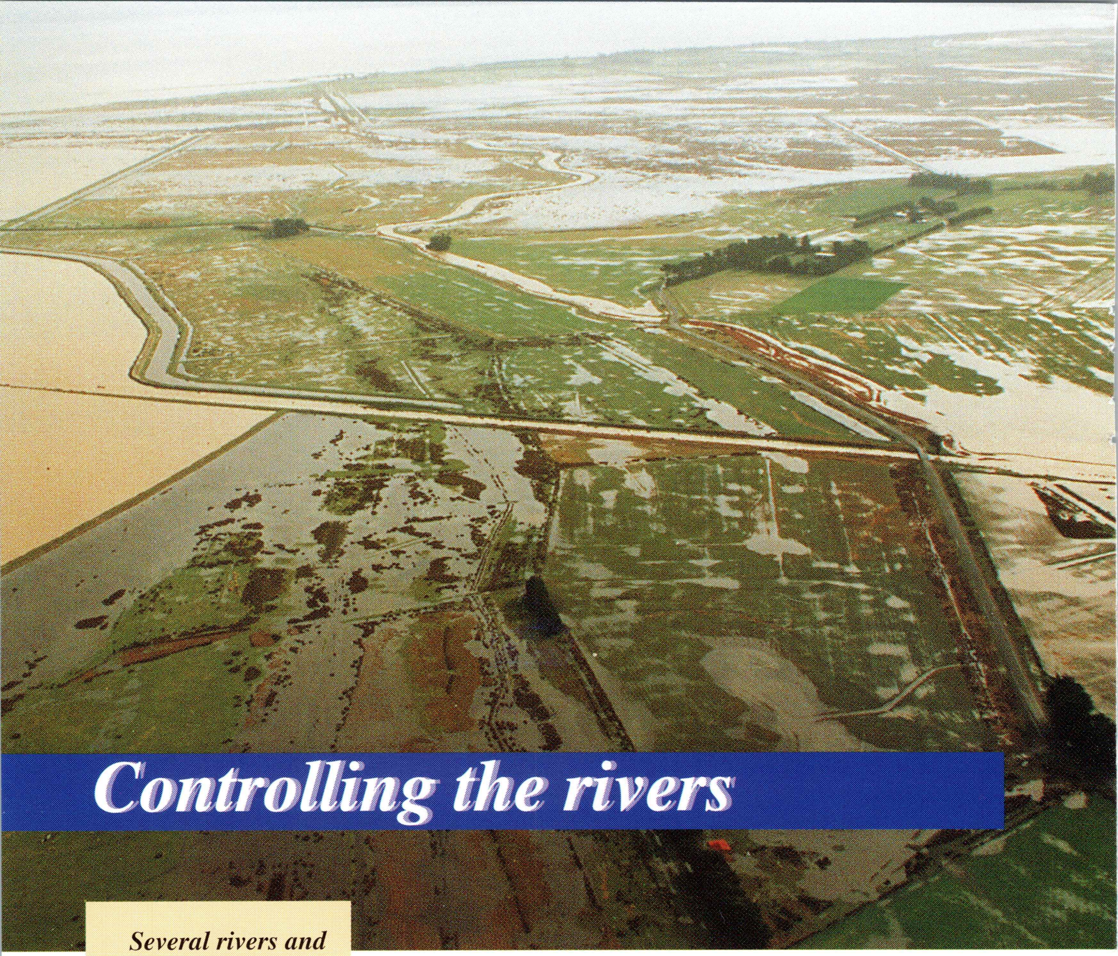
Controlling the lake levels

Left to itself the lake level would rise as high as 4 metres above mean sea level before naturally breaching Kaitorete Spit.

From the earliest days of European settlement variations in lake levels caused flooding of farmland. During strong south westerly winds the water level on the northern side of the lake can rise by 0.6 metres, a direct result of the wind force.Calls for control began in 1867. In 1877 the Selwyn County Council let tenders for opening the lake. Horse-drawn scoops were used. There were attempts to maintain a permanent culvert from 1904, but these were largely unsuccessful.

Artificial openings are now managed by the Canterbury Regional Council in accordance with the National Conservation Order. Mechanical openings about 200 metres long are made through the beach at Taumutu and are dependent on the weather for success. In 1996, the cost was about $122,000. This directly benefits 14,000 hectares of farmland.

Preparing the opening to the sea. Above: 1979. (Ray Dineen)
Below: At the turn of the century. (Courtesy Woods Family)



Controlling the rivers

Several rivers and around 40 minor tributary streams and drains flow directly into the lake. A number of them create flooding and drainage problems.

Surface flooding around the north-east margins of the lake, August 1992. (John Weeber)

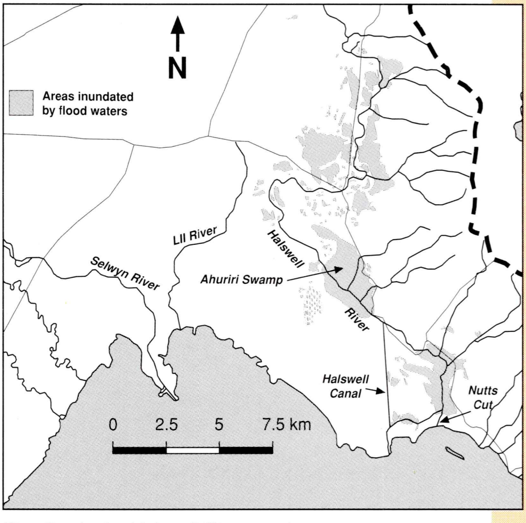
Flooding in the middle and lower reaches of the Selwyn follows heavy rainfall in the Highpeak-Flagpole foothills. Maintaining the flood protection scheme costs around $120,000 a year, for erosion planting, channel alignment and clearance.

Data from telemetered rainfall measuring stations allows flood warnings to be made. The Selwyn District Council is responsible for planning controls on land use to reduce risks to people and property.

The Halswell River discharges into Lake Ellesmere-Te Waihora via two major diversions. It carries runoff water from the southern hills of Banks Peninsula as well as draining the Halswell-Prebbleton-Tai Tapu-Ladbrooks-Lincoln-Greenpark district. This area is essentially a drained wetland and prolonged or heavy rainfall can cause surface ponding and drainage problems.

The stability and flood-carrying capacity of the river channel are maintained over 42 km. The total length of public drains in the Halswell River catchment is 115 km, with a further 50 km of drains serving private properties.

The annual works budget for the Halswell Drainage District is $375,000, which is used to maintain the drainage system by weed cutting, excavation, spraying, removing blockages and repairing floodgates. The extensive drainage system associated with the river was constructed late last century and needs considerable maintenance.



Flooding in the Halswell River catchment.

Administration

The catchment lies within three territorial local authority districts. Most is within Selwyn District with small areas in Christchurch City and Banks Peninsula District.

Population

Population in the catchment is on the increase. Census data shows it rose about 10% in the ten years to 1991. The Christchurch commuter zone is spreading outwards with the demand for lifestyle blocks and retirement homes near the city. Halswell, part of Christchurch, is included in the catchment.

The rural service towns are dominated by the presence of Christchurch. The population distribution generally reflects the variations in intensity of land use which ranges from small horticultural units to large pastoral farms.

Taitapu after the floods of August 1992. (John Weeber)

Groundwater in the catchment

Groundwater, replenished by water from rivers and rainfall, filters down through permeable water-bearing layers of gravels called aquifers. Groundwater provides the source of spring-fed streams in the lower catchment.

How much and where is it?

Most of the water flowing into the lake comes from the groundwater system underlying the Canterbury Plains.

An estimated 840 million cubic metres of groundwater moves through the catchment each year. It comes from rainfall, rivers and their tributaries, water race seepage, foothills runoff and drainage from irrigation.

Groundwater moves slowly through these aquifers at speeds of up to 100 metres a day. In the eastern catchment the aquifers are confined by overlying sediments which have a low permeability, reducing vertical seepage.

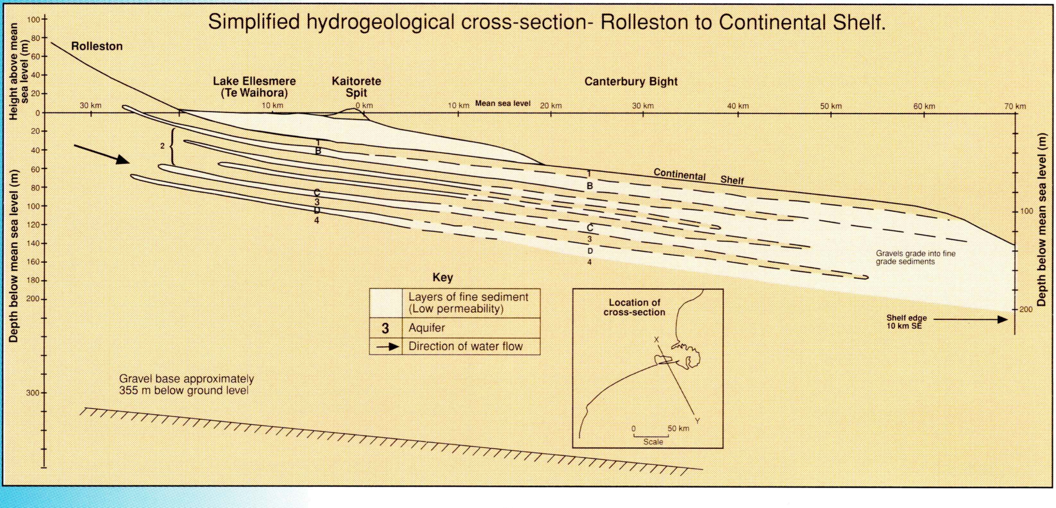
About 80% of the groundwater system is unconfined. Close to the lake four confined aquifers have been identified from the drilling logs of bores. Here the gravel aquifers are generally well defined and are separated by relatively impermeable sediment.

Approximate depths of aquifers near the lake

Aquifer depths below ground level are:

Aquifer 1	0 - 25 metres
Aquifer 2	21 - 45 metres
Aquifer 3	40 - 85 metres
Aquifer 4	deeper than 95 metres

The groundwater generally flows from the foothills across the plains in a SE direction.



Simplified hydrogeological cross-section- Rolleston to Continental Shelf.

Height above mean sea level (m)
100
80
60
40
20
0
Depth below mean sea level (m)
20
40
60
80
100
120
140
160
180
200
300
Rolleston
Lake Ellesmere (Te Waihora)
Kaitorete Spit
Canterbury Bight
30 km
10 km
0 km
10 km
Mean sea level
20 km
30 km
40 km
50 km
60 km
70 km
2
1
B
C
3
D
4
Continental Shelf
Gravels grade into fine grade sediments
Depth below mean sea level (m)
100
200
Shelf edge 10 km SE
Key
Layers of fine sediment (Low permeability)
3 Aquifer
Direction of water flow
Location of cross-section
X
Y
0
50 km
Scale
Gravel base approximately 355 m below ground level

Where does it come from?

More than half the groundwater comes from rainfall, about 452 million cubic metres a year. About 300 million cubic metres comes from recharge from the Selwyn, Waimakariri and Rakaia rivers. The balance comes from seepage from water races, and other rivers and streams.A large percentage of the upper Selwyn River flow is lost underground and recharges the aquifers. It is not known exactly how much underground flow from the Waimakariri and Rakaia rivers enters the Lake Ellesmere-Te Waihora catchment. However, as the lake was once an estuary for the Waimakariri, old river channels may still exist at depth. Some streams flow directly into the sea along the coastline between the lake and the Rakaia River.

Where does it go?

Groundwater seeps into the lower reaches of the Selwyn, and into spring-fed streams. These springs supply up to two-thirds of the fresh water input into Lake Ellesmere-Te Waihora. There are some lake bed springs on the western edge.

About 5700 bores abstract an estimated average total of 126 million cubic metres of groundwater a year, most of it for agricultural use as spray irrigation. Groundwater is also used for public water supplies, domestic wells, stock water, aquaculture and industrial uses.

Surface water

Where does it come from?

The main source of surface water is rainfall in the hill country of the upper Selwyn River. Some comes from the hills of Banks Peninsula, flowing in the small streams between the Landsdowne and Prices valleys. In some areas, such as the coastal plains, groundwater seeps into the rivers or flows out as spring-fed streams.

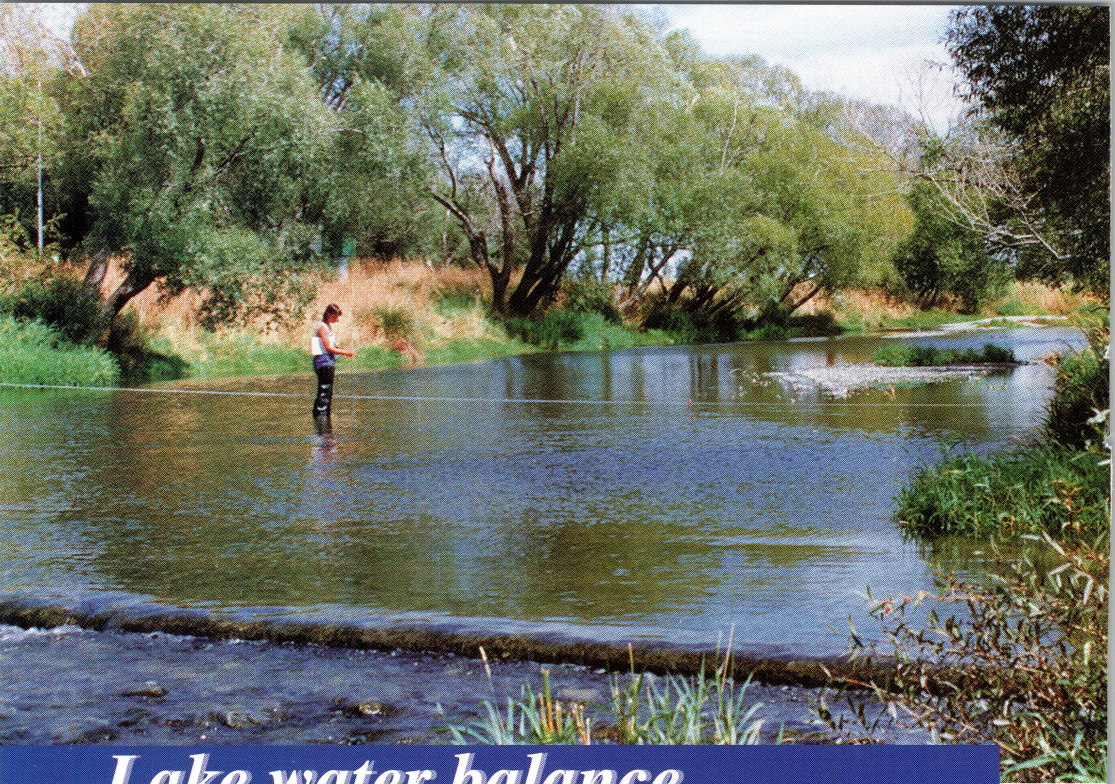
The headwaters of the Selwyn River lie in hill country where rainfall totals vary with altitude, from about 900 mm a year in the south to 1600 mm a year in the Big Ben Range.

On the Canterbury Plains rainfall averages 750 mm a year. A lot of this rainfall seeps into extensive groundwater storage in the gravel aquifers.

In the lower plains and Ellesmere areas the mean rainfall is about 650 mm a year which is less than evapotranspiration rates, or losses from the soil to the atmosphere. Outside the lake is a region of largely spring-fed streams, part of a larger groundwater discharge zone extending along much of the coast between the Ashley and Rakaia rivers. The groundwater feeding the springs is thought to come from seepage from the Selwyn and other rivers.

Further rainfall comes from Banks Peninsula, ranging from about 700 mm a year along the lower slopes to more than 1500 mm a year near the head of the Kaituna Valley.

Many streams within the catchment have highly variable flows which generally drop to very low rates during summer. Most floods result from heavy SW rain and may occur in any month of the year.



Lake water balance

Gauging the water flow at Coes Ford. (Graeme Horrell)

Lake Ellesmere-Te Waihora has a surface area of about 189 square kilometres (at a water level of 0.8 metres above mean sea level). The lake level at any time is determined by the complex balance between inflows and outflows and the storage of water in the lake.

The inflows come from the lake tributaries, rainfall, groundwater issuing through the lake bed, and seawater incursion through or over the Kaitorete Spit resulting from artificial openings or rough weather.

Outflows are due to evaporation, breaching of, and seepage through the Spit.

Vital linkages

Only 8% of the water taken for irrigation and other out-of-stream uses is drawn from surface water - 92% comes from groundwater. It is important for managing the total water resource that the linkages between groundwater and surface water are understood. Flow in many streams is largely a function of groundwater levels and rivers can flow under their beds for considerable distances. Losses from streams in the upper Selwyn River contribute 20-30% of the recharge of groundwater systems within the catchment.

Water quality

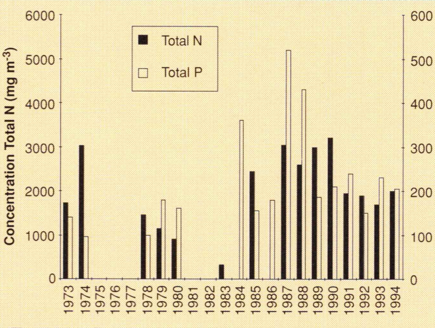
Lake Ellesmere-Te Waihora

The lake is neither entirely freshwater nor estuarine. Salinity varies and is highest at the Taumutu opening. Some sea water seeps through the gravels of the Kaitorete Spit along the south side of the lake. The proportion of sea water can be estimated from chloride ion measurements which show the mean concentration is around 20% sea water. Salt concentrations rise, as expected, after the lake has been opened.

The lake is often described as eutrophic, that is rich in plant nutrients, especially nitrogen and phosphorus.

The consequences of eutrophication of lakes can include deoxygenation of the bottom waters and sediments, regular blooms of lakes algae, profuse weed growth, and lack of salmonid fish. Although Lake Ellesmere-Te Waihora has very high concentrations of green algae, toxic blooms are rare and other characteristics of eutrophication are not present.

There is not enough scientific information to identify any long-term water quality trend since European settlement. Data collected over the past 20 years does not indicate any general increase in nutrient concentrations.



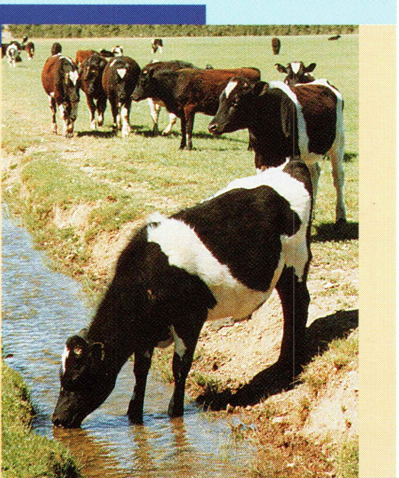
Total N & P concentrations in the lake 1973 - 1994.

One measure of the trophic status of a water body is the rate of primary production - the rate at which microscopic plants (phytoplankton) grow. Measurements indicate the lake ecosystem is productive, but not excessively so.

The lake waters are well mixed by wave action. There is constant re-suspension of sediments. This turbidity limits light availability for phytoplankton growth. The wind keeps the waters well oxygenated. Nutrients are flushed out with lake openings.

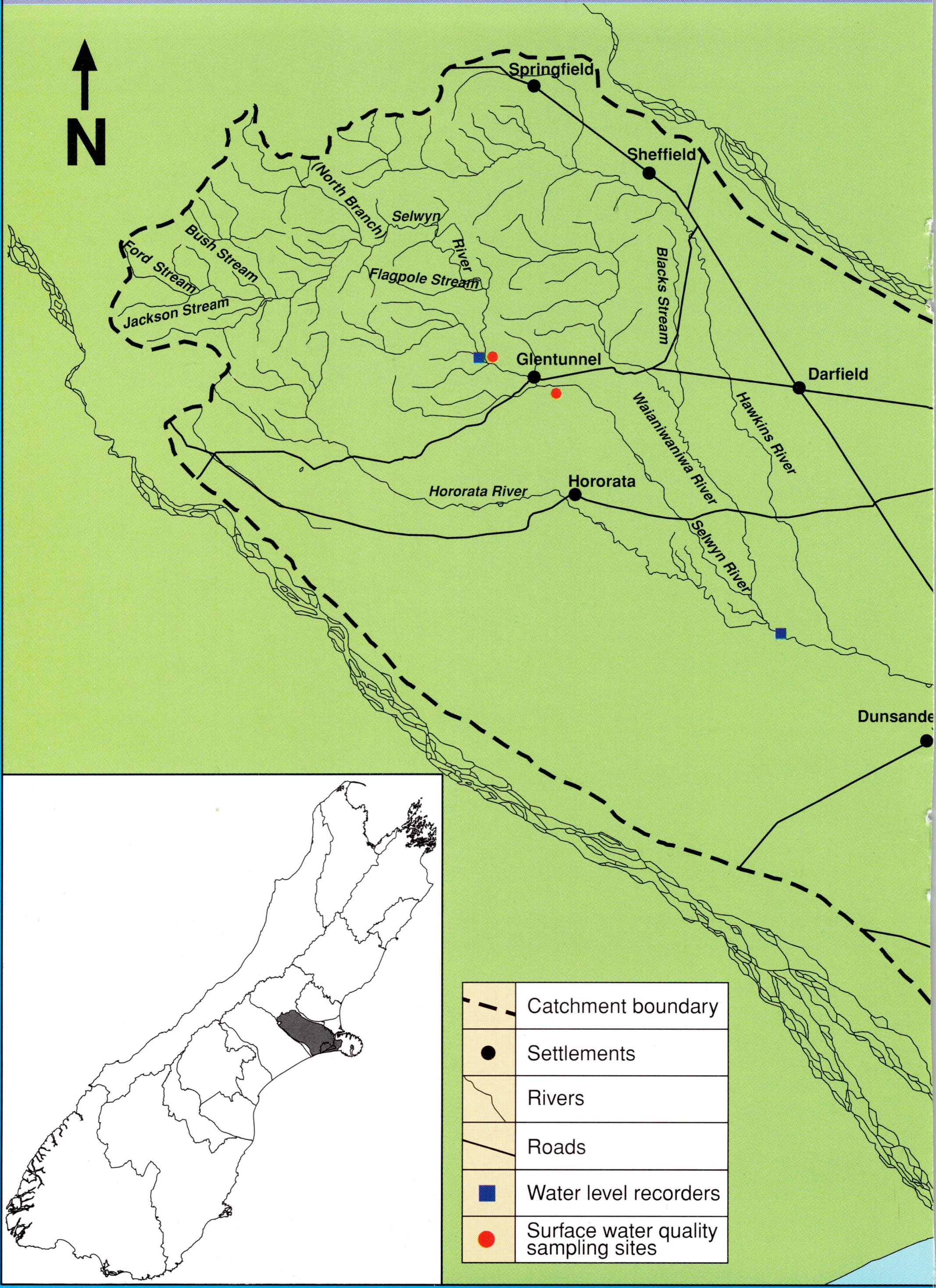
The tributaries

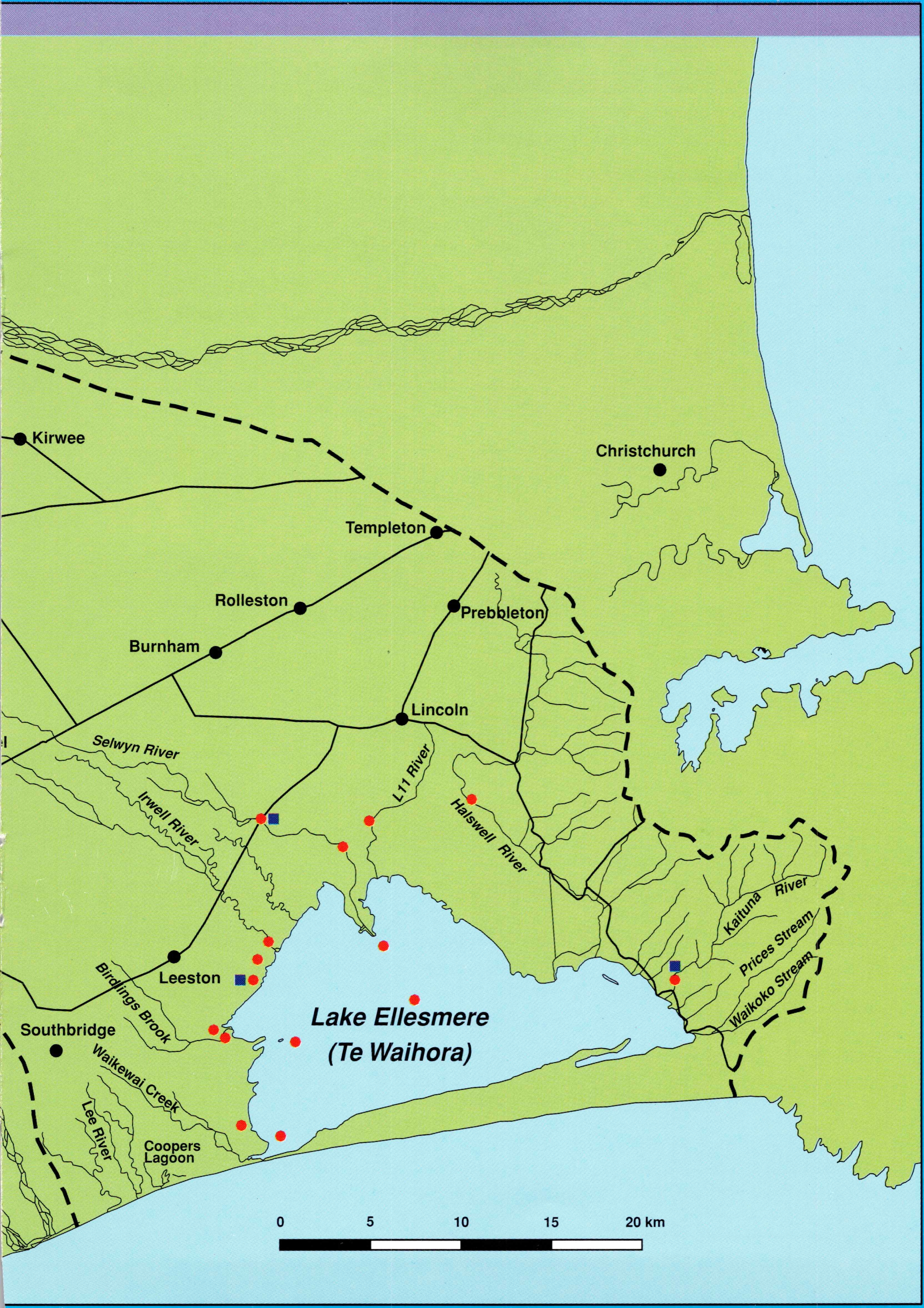
Summer monitoring has shown some of the popular swimming areas at times breach water quality guidelines for contact recreation, e.g. Coes Ford, Glentunnel. Concentrations of faecal coliform bacteria indicate contamination by human or animal faeces. In most cases, this contamination results from run-off from pastoral land, or when grazing animals defecate directly into drains, streams and rivers.



Grazing stock contributing to stream contamination. (John Weeber)

Lake Ellesmere- Te Waihora and its catchment.

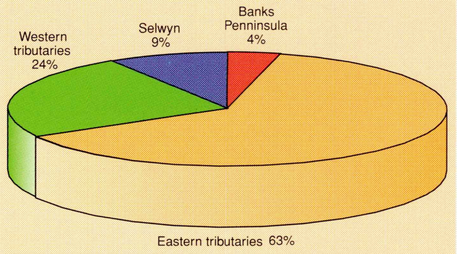



Kirwee
Christchurch
Templeton
Rolleston
Prebbleton
Burnham
Lincoln
Selwyn River
L11 River
Irwell River
Halswell River
Kaituna River
Prices Stream
Waikoko Stream
Leeston
Birdlings Brook
Southbridge
Lake Ellesmere
(Te Waihora)
Waikewai Creek
Lee River
Coopers Lagoon
0
5
10
15
20 km

Sources of nutrients

A long term monitoring programme was established in 1992 to identify where nutrients in the lake were coming from and their seasonal variations.

Different parts of the catchment contribute different proportions of nitrogen and phosphorus to the lake. For example, large quantities of phosphorus come down the Selwyn River during major floods, most of it from riverbank erosion and carried in suspended sediment. However, under more normal flows the contribution from the Selwyn is relatively small.



Proportional contribution of phosphorus to the lake.

The plains tributaries east of the Selwyn River contribute nearly 66% of the total phosphorus to the lake under average flows. This reflects the more intensive land use from cropping, dairying, pig-farming and horticulture. It is also the area with the most population.

An estimated 3600 tonnes of nitrogen is leached to groundwater each year from the Central Plains area.

Discharges

Several types of direct discharges to the tributaries have the potential to reduce water quality. Waste disposal of animal effluent is a significant contributor of nutrients to the water systems.

Township oxidation ponds discharge to the tributaries, impacting on water quality by contributing nutrients and micro-organisms. Stormwater from urban areas and land drainage discharges to surface water can contain many contaminants.

Only a small number of dwellings in the lower catchment are connected to reticulated sewerage systems. Septic tank failures are not uncommon in the wetter areas, e.g. Tai Tapu, Southbridge and Springston. This can result in the direct entry of contaminants into surface water.

Groundwater quality

The groundwater quality at about 50 well sites in the catchment has been monitored since 1986. The general results show the quality is high and suitable for drinking. Water quality improves with depth.

Unconfined groundwater is susceptible to contamination from industrial and agricultural discharges and land use activities. Monitoring has shown traces of pesticides in groundwater from shallow wells near Prebbleton.

Septic tank effluent disposal, especially where there is a higher density of tanks, e.g. unsewered townships, can contaminate groundwater. An indicator of this is the detection of faecal coliforms, which renders water unsuitable for drinking.

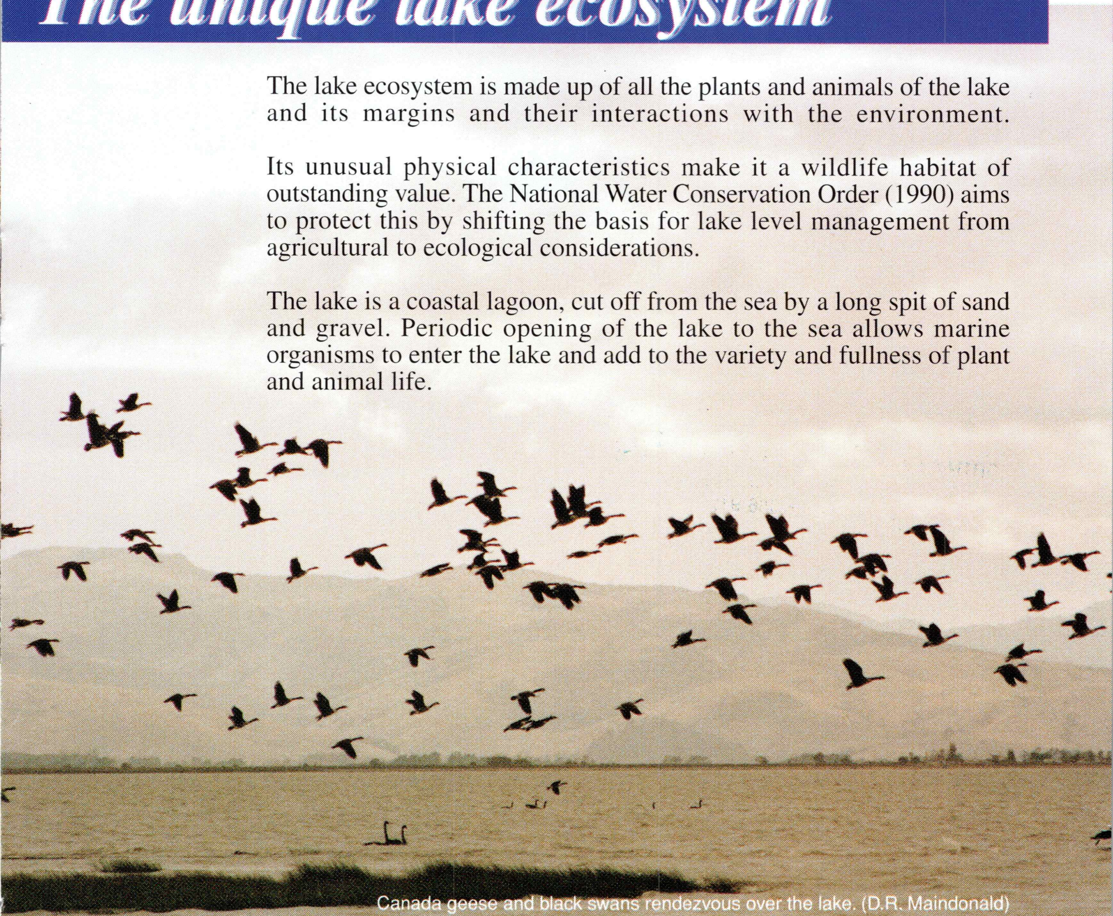
The main source of nitrate-nitrogen in groundwater is the urine and dung of grazing animals. Shallow groundwater shows a seasonal pattern of nitrate-nitrogen contamination with higher concentrations when the water-table is closest to the ground surface in late spring-early summer.

The unique lake ecosystem

The lake ecosystem is made up of all the plants and animals of the lake and its margins and their interactions with the environment.

Its unusual physical characteristics make it a wildlife habitat of outstanding value. The National Water Conservation Order (1990) aims to protect this by shifting the basis for lake level management from agricultural to ecological considerations.

The lake is a coastal lagoon, cut off from the sea by a long spit of sand and gravel. Periodic opening of the lake to the sea allows marine organisms to enter the lake and add to the variety and fullness of plant and animal life.



Canada geese and black swans rendezvous over the lake. (D.R. Maindonald)

Life in the food web

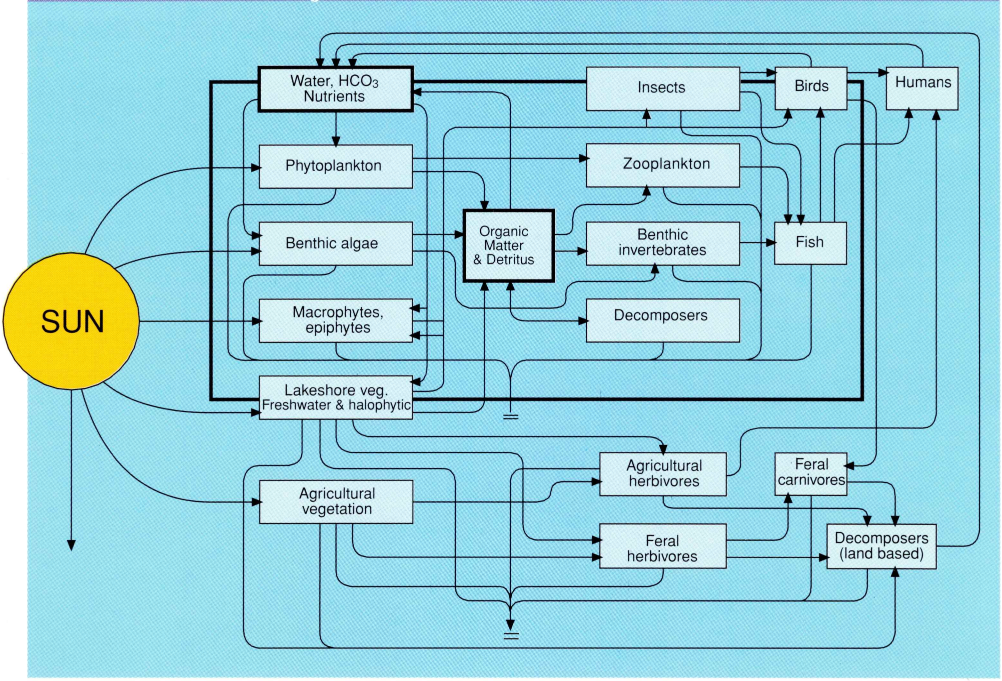
- *or what eats what and in turn is eaten*

The complex food web (see page 16) within the lake is based on green plants which convert the sun's energy into organic matter through the process of photosynthesis.

These plants include phytoplankton (microscopic floating green plants), other small attached algae, large submerged plants, and lake-edge plants that are sometimes submerged. Blue-green algae are an important feature of the lake because of their potential to bloom at times, producing a toxic scum which can kill fish, or animals that drink the water.

The algae provide food for zooplankton (microscopic animals living in the lake water) and other invertebrates which in turn are eaten by fish and birds, as are the large plants. Dead plant and animal material is consumed by decomposers like fungi and bacteria. This process releases nutrients for subsequent plant growth. The decomposers are themselves eaten by invertebrates and their predators, fish and birds. Large eels are the top predators within the lake food chain.

Lake Ellesmere food web



Living on the edge

- where land and water meet

On the shore line, the link between the lake and land parts of the food web is provided by plants, insects and birds. The vegetation is eaten by insects, birds, sheep, cattle and wild animals like rabbits and hares. The terrestrial food web includes humans - the hunters and fishers who use the lake and its margins.

Interactions

If one of the links in the food web is affected by changes in the lake environment it will affect other parts of the ecosystem.

The principal factors controlling the abundance and diversity of organisms in the lake are:

salinity

lake level and water surface area

nutrients

turbidity

dissolved oxygen

the movement of lake-bed sediment

Of these changes, salinity and lake level have the most influence on plants and animals. For example, a reduction in salinity could help re-establish the lake weed beds, but could adversely affect the saltmarsh vegetation.

Plants and wildlife of the lake and its margins

Plants are the foundation of the lake's ecosystem. As well as providing food and shelter for other plants and animals above and below the water, they make a major contribution to the landscape.

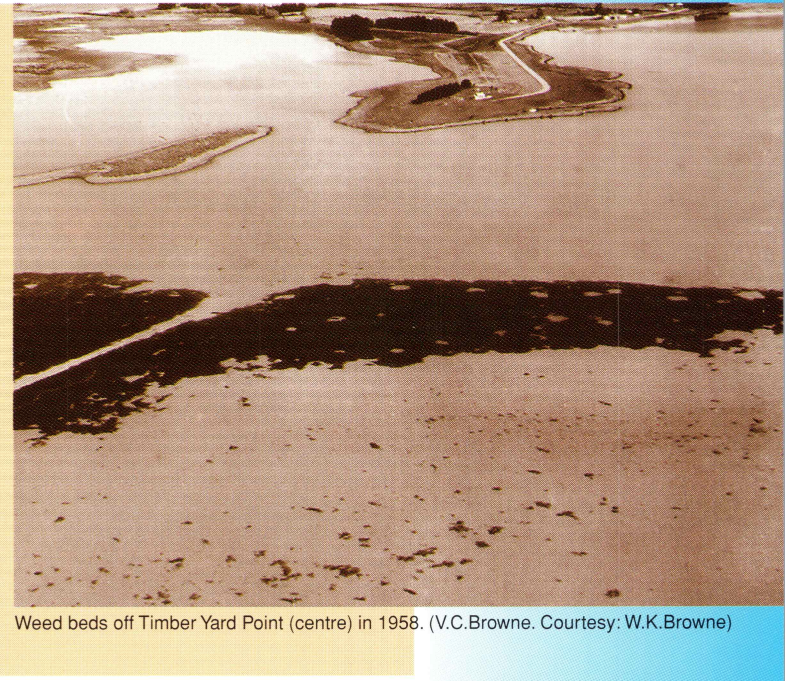
Extensive canopies of floating weeds were once a feature of the lake margins. The weed beds were devastated in the 1968 Wahine storm and have never recovered. They were important in the ecosystem for food production and habitat, and, by trapping sediment and acting as a wave buffer they improved water clarity in parts of the lake. It is thought salinity and low light levels in the water limit their re-growth.

More than 80% of the large wetlands of flax, raupo and sedges which once surrounded the lake have been destroyed or modified with conversion of the lake margin to farmland. Remnants are limited to a narrow fringe at the lake edge. The clearance of plants from streams and drains to aid land drainage has reduced habitat for birds and other animals.

At least 54 vegetation types or plant communities around the lake have been identified.

These fall into four natural groupings:

- **submergent species, or plants which are underwater for long periods, e.g. native musk**
- **salt-tolerant plants or halophytes found on the sandy salt marshes, e.g. glasswort**
- **fresh-water wetland species, e.g. raupo and willow growing in areas of low salinity**
- **pasture grasses and their associated weeds**



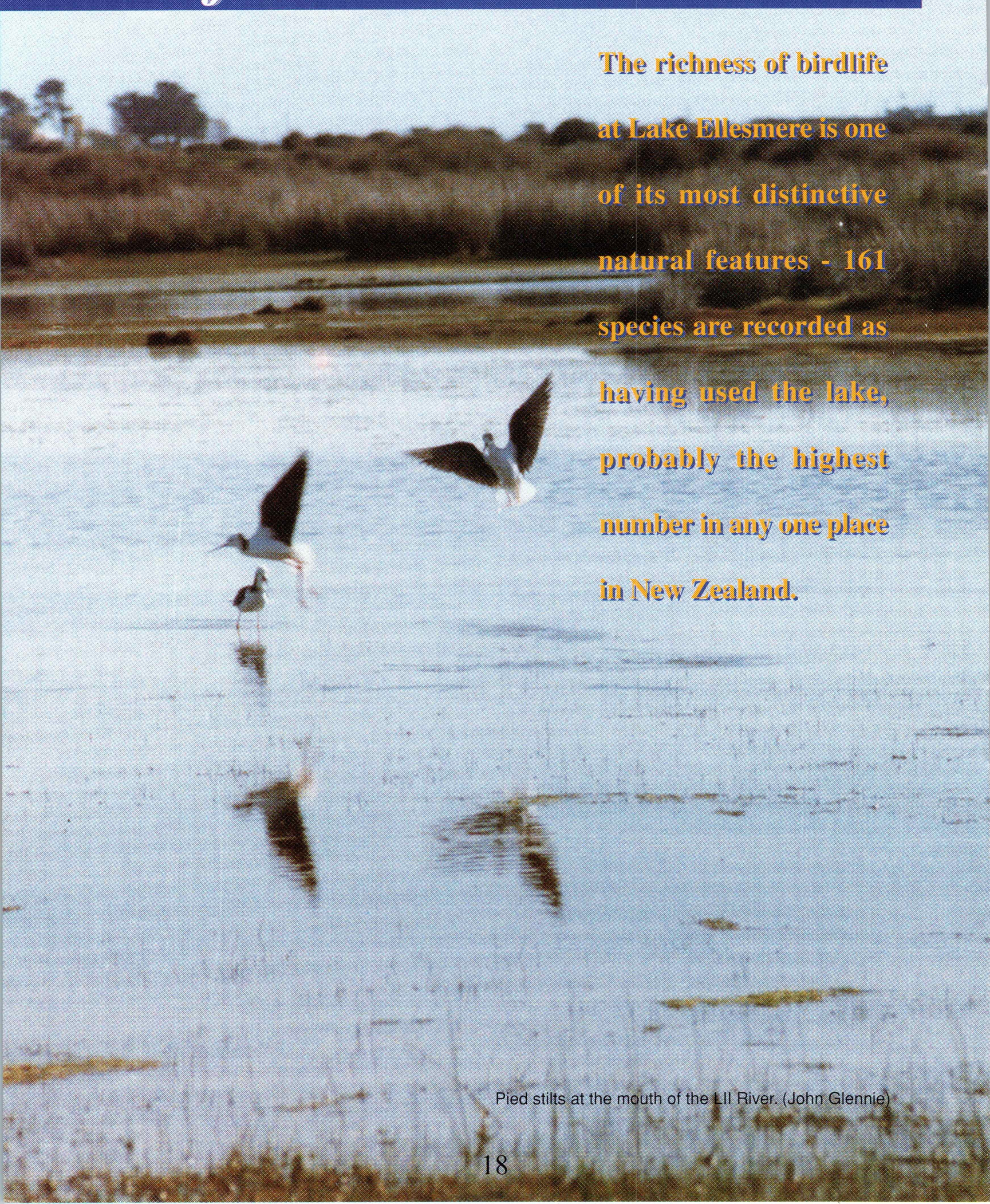
Weed beds off Timber Yard Point (centre) in 1958. (V.C.Browne. Courtesy: W.K.Browne)

The distribution of these plants depends on water salinity, elevation, sediment, soil type and the effects of human activities, e.g. lake level control, reclamation of wetland, burning and grazing.

Rare and unusual species found on the lake margins include a native orchid (*Spiranthes sinesis*) and the giant umbrella sedge (*Cyperus ustulatus*). One nationally important botanical area, because of the rarity of its vegetation type, is the Greenpark Sands, an extremely rare saline lagoon saltmarsh on sandy soil.

Birdlife

The richness of birdlife at Lake Ellesmere is one of its most distinctive natural features - 161 species are recorded as having used the lake, probably the highest number in any one place in New Zealand.



Pied stilts at the mouth of the LII River. (John Glennie)

Although at least 37 species breed in the area, most are seasonal and numbers fluctuate, e.g. white heron in winter, godwit, wrybill, and red-necked stint in summer.

Most of the birds can be divided into three groups - waterfowl, waders and swampbirds. This division is made on the basis of their habitat and food supply requirements.

Waterfowl - geese, swans and ducks

These are the most prominent in numbers, diversity, hunting opportunities and, for swans and geese, impact on agricultural land.
Many are present in large numbers, e.g. Canada geese, black swans, and three species of duck - mallard, shoveler and grey teal. Only the black swans breed in large numbers at the lake. The rest use it for loafing or feeding. The waterfowl have long been valued by game bird shooters.

Waders

Wading birds are seasonal visitors, using the lake for resting during migration or to escape the northern hemisphere winter. They are predators, foraging for insects in the shallow waters. Waders include the curlew sandpiper, red-necked stint, wrybill, banded dotterel and pied stilt.

Swamp birds

The most common is the pukeko, which feeds on shoots, roots, insects and other invertebrates. Three other species seen less frequently, partly because of their secretive natures, are the Australian bittern, marsh crake and the rare spotless crake.

Other birds important to the lake's ecology are shags and herons and sea birds such as gulls and terns.

Outstanding habitats

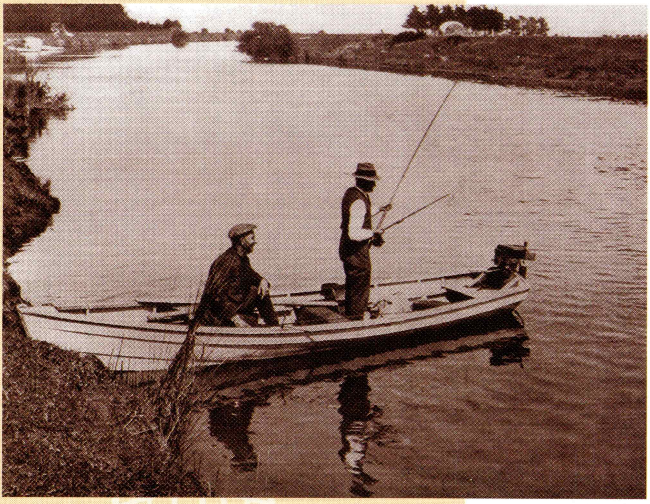
Six of the areas around Lake Ellesmere-Te Waihora are rated as having outstanding importance for wildlife. These include the low-lying tracts of land between the Selwyn delta and the Halswell River which support large populations of waders, and the waterfowl habitats of the Kaituna Lagoon - Birdlings Flat area.

Changes

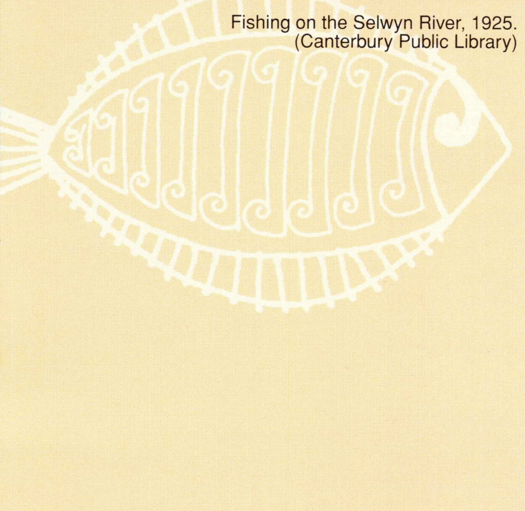
Since European settlement there have been changes to the wildlife population. The most significant factor in the loss of species is likely to have been the reduction of habitat caused by lower lake levels and swamp drainage.

Pukeko nesting at Lake Ellesmere.
(Department of Conservation)

Fish of the lake and its tributaries



Fishing on the Selwyn River, 1925.
(Canterbury Public Library)

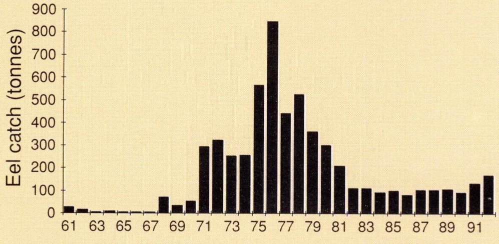


The whole catchment has high fishery values - 43 species have been recorded in the lake and its tributaries.

Since European settlement it is likely that drainage, farming and commercial fishing have contributed to the decline in fish stocks and distribution. However, the most recent and dramatic change to fish population was probably the result of the loss of weed beds in the lake.

Trout, which have increased in number since they were introduced by settlers, had an impact on native fish. One rare species, the giant kokopu, is no longer seen in the catchment. The Canterbury mudfish is still found in and about some tributaries.

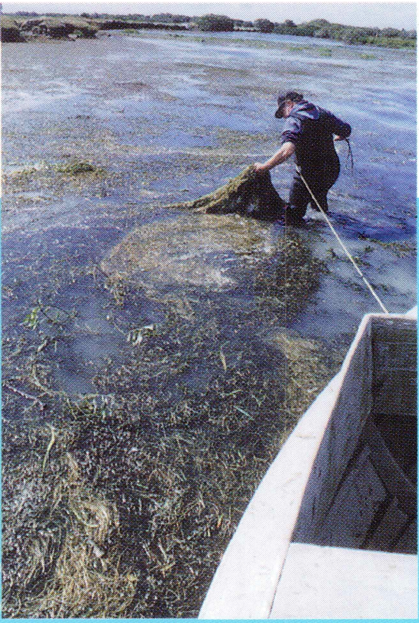
Eel, flounder, and yellow-eyed mullet are fished commercially and recreationally. Trout, perch and whitebait (inanga) are fished for sport. The Selwyn River was once a prized trout fishery but fish numbers have decreased markedly since the early 1970s.



Reported annual eel catch (tonnes) for Lake Ellesmere
1961-1992.

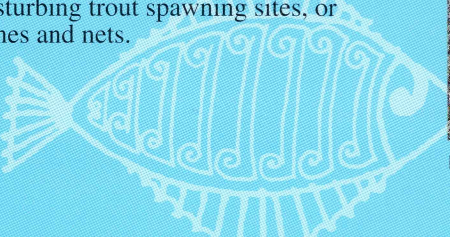
Managing the fishery

- The timing of lake openings is a relevant factor in managing the fisheries as it can impact on fish migrations. For example, during February and March, adult eels attempt to migrate to sea.



Effect of drifting weed on flounder nets at the mouth of the Halswell River. (Christchurch Press)

- The flow requirements for fish in the tributary streams need to be considered, e.g. the spawning and feeding habitats provided by the spring-fed streams and larger streams draining the Banks Peninsula hills.
- Flood control works and drain maintenance can also affect fish habitat and fishing, e.g. by disturbing trout spawning sites, or fouling lines and nets.



Anglers pose with their catch taken from the Selwyn River in 1910. (Canterbury Museum)

Recreation

Less than an hour's drive from Christchurch, Lake Ellesmere-Te Waihora is a popular mecca for a range of recreation activities. It is one of the country's best places for bird watching and attracts hundreds of duck and goose shooters and fishers. It is popular for water sports, land-yachting and picnics.

Photo courtesy: Springston School.

Bird watching

Sightings of relatively rare birds and the large numbers of many migratory birds give the lake national importance as a bird watching venue. It is the final important stronghold in Canterbury for some swampbirds, e.g. bitterns.

Waterfowl hunting

The presence of many thousands of water fowl make Lake Ellesmere-Te Waihora the region's most important bird shooting area. The most popular species with hunters are mallard, grey duck, Canada goose and paradise shelduck. There can be up to 1000 hunters around the lake at the opening of the shooting season in May.

Fishing

The wide variety of fishing available in the lake and its tributaries is the main drawcard. Trout fishing is popular on the lake edge, in the slow-moving waters of the lower reaches of the tributaries, and in their upstream pools and riffles. The decline in trout numbers has seen the fishery slide from national to regional importance. Perch angling, eeling, whitebaiting, floundering and surf-casting also occur around the lake.

Water sports and land yachting

Water skiing, boat racing, yachting, canoeing, jet-skiing and windsurfing are based mainly at Lakeside, while land yachting takes place on sand flats on the NE side of the lake.

Lack of access to the lake is a big concern to most recreational users, as is a perceived decline in water quality. Conflicts between different activities is an important issue, particularly disturbance of tranquillity and habitat.

Management options for the future

Many of the matters to be considered in future options for sustainable management involve consideration of different needs. The Resource Management Act requires that the well-being of the environment must be safeguarded. That will have consequences for farming inputs and outputs, soil fertility, and surface and groundwater quality. It will also influence drainage, lake opening levels, urban development, recreation, and the maintenance and restoration of wetlands and lake margins.

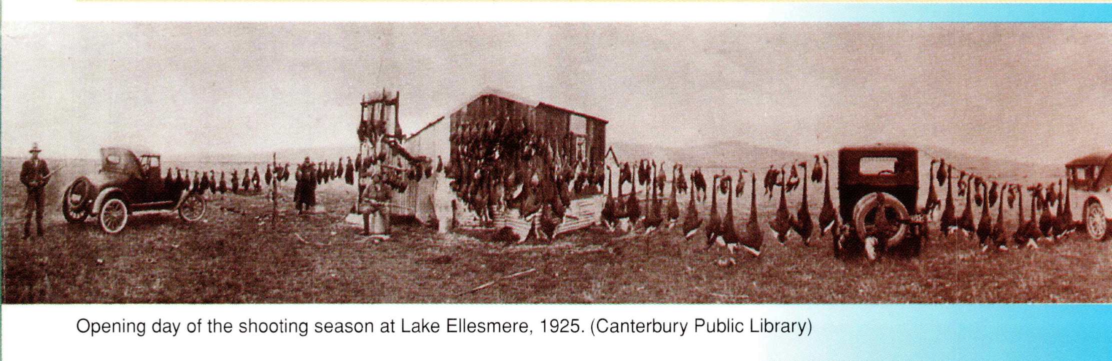
Everyone wants long-term sustainable management of the water resources. Surface and groundwater are closely linked but more understanding of this relationship is needed. Water balance modelling is being undertaken to assess the impacts of the abstraction of groundwater on water levels, aquifer pressure and tributary flows. Proper management of the allocation and use of water depends on detailed information and highly technical computer modelling.

Investigations of the factors which affect the quality of the lake, including the relationship between nutrient inflows, light and phytoplankton growth are also being undertaken.

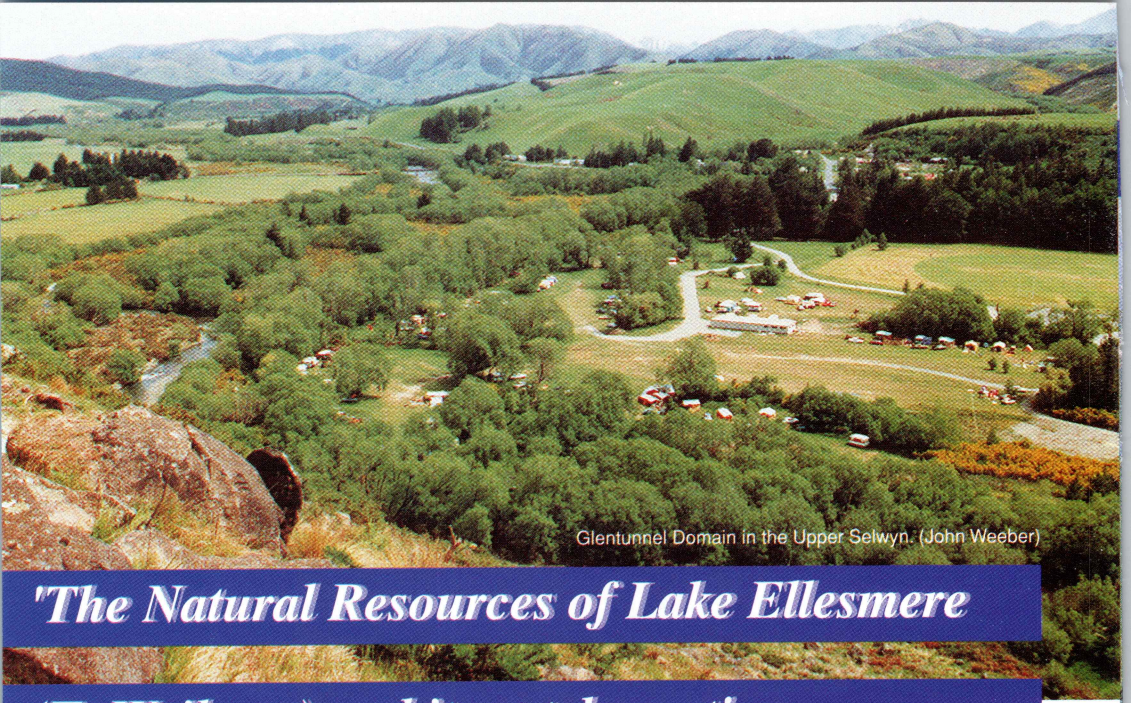
The Regional Council's technical report (see page 24) identifies a number of matters that will need to be considered in managing these resources, particularly in relation to the quality and availability of water.

Among these are:

- the need to manage agricultural land uses to reduce the input of nutrients and other contaminants to the lake and tributaries
- options for the management of the margins of the lake shore and lower tributaries
- the costs and benefits of re-establishing macrophyte beds in the lake
- the way in which abstractions are controlled, including the establishment of minimum flows for the tributaries
- options for controlling lake levels, including the timing of, and target levels for opening, mechanical closure and controlled outlet structures
- the timing and methods of river control and drain maintenance works
- the need to maintain and enhance wetlands



Opening day of the shooting season at Lake Ellesmere, 1925. (Canterbury Public Library)



Glentunnel Domain in the Upper Selwyn. (John Weeber)

'The Natural Resources of Lake Ellesmere (Te Waihora) and its catchment'

This technical report, published by the Canterbury Regional Council as Report 96/7, costs $15.00.

Edited by the Regional Council's Environmental Quality Manager, Ken Taylor, it provides scientific information about Lake Ellesmere's physical, biological and cultural resources.

Its 340 pages cover 15 chapters with 15 appendices, 10 colour and 55 black and white photographs, 112 figures, 107 tables and 320 references.

The report concludes several years of investigations. The lake's water quality and the hydrology of its catchment are detailed. Activities that may influence water quality or lake water movement are described. The values and uses of the area are outlined. The complex lake ecosystem is explained. There are listings of the wildlife using the area, and its outstanding habitat values.

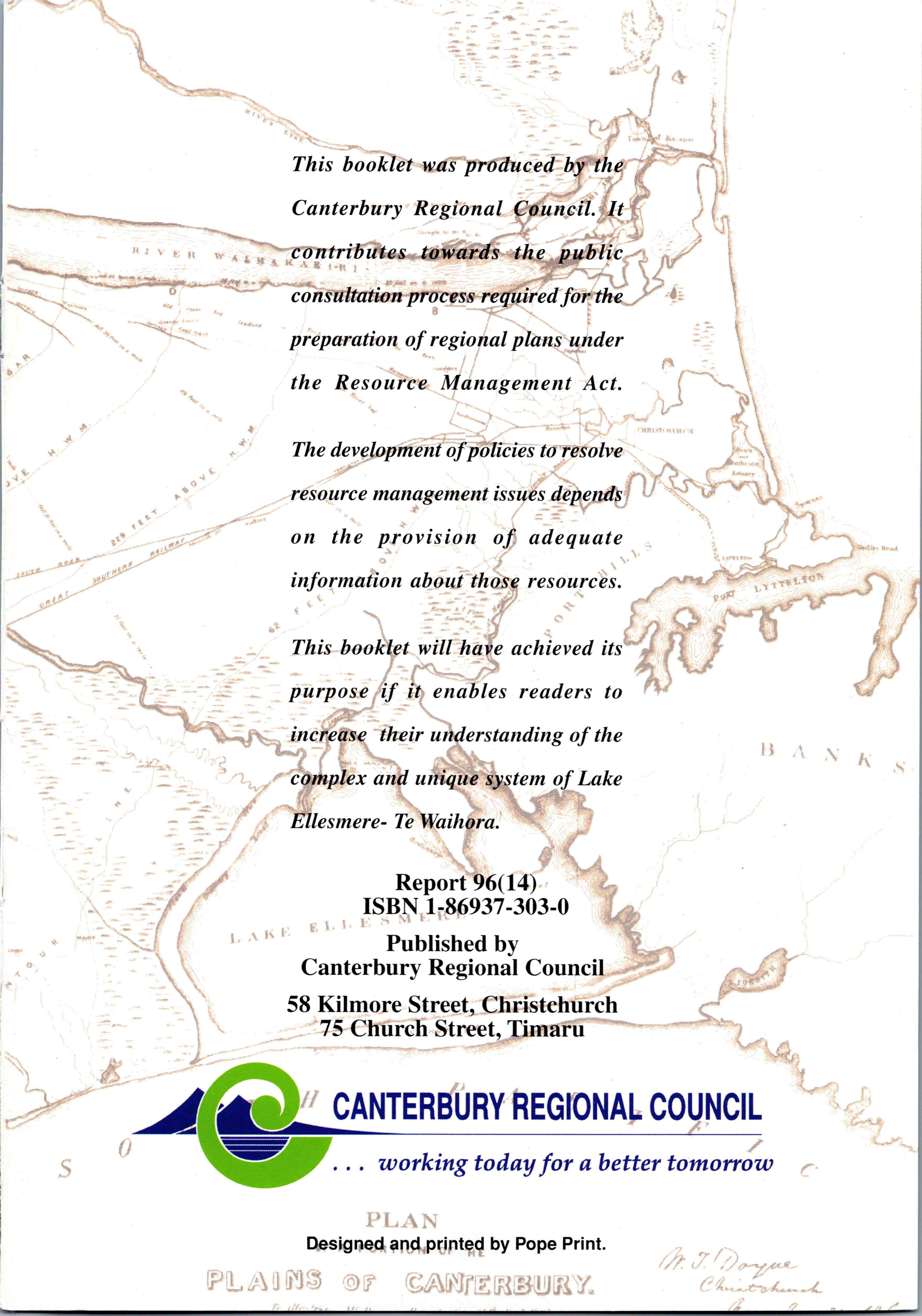
This booklet gives an overview of the report.

What next?

The Canterbury Regional Council is continuing its resource investigations for the lake. It has undertaken to set water quality standards for the lake, its tributaries and associated groundwater.

Using the report, the Canterbury Regional Council is progressing towards developing methods for the sustainable management of the natural resources of the catchment.

Objectives, policies and methods for the lake and its catchment will be contained in the Council's Natural Resources Regional Plan.



This booklet was produced by the Canterbury Regional Council. It contributes towards the public consultation process required for the preparation of regional plans under the Resource Management Act.

The development of policies to resolve resource management issues depends on the provision of adequate information about those resources.

This booklet will have achieved its purpose if it enables readers to increase their understanding of the complex and unique system of Lake Ellesmere- Te Waihora.

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Kaitorete Spit looking south-west. (John Weeber)